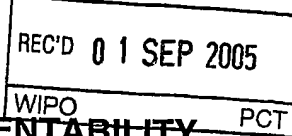


PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



10/553289

Applicant's or agent's file reference 2252-105	<p style="text-align: center;">FOR FURTHER ACTION</p> <p style="text-align: right;">See Form PCT/IPEA/416</p>	
International application No. PCT/CA2004/000577	International filing date (day/month/year) 19.04.2004	Priority date (day/month/year) 17.04.2003
International Patent Classification (IPC) or national classification and IPC E02F3/38		
Applicant INT. SILVATECH INDUSTRIES INC. et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 8 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand 10.11.2004	Date of completion of this report 30.08.2005	
Name and mailing address of the International preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Bunn, D Telephone No. +49 89 2399-2086 <div style="text-align: right;"> </div>	

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/CA2004/000577

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-6 filed with telefax on 24.06.2005

Claims, Numbers

1-7 as originally filed

Drawings, Figures

5-9 as originally filed

1-4 filed with telefax on 15.04.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:
 4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☒ the claims, Nos. 1-7
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/CA2004/000577

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	5
	No: Claims	1-4,6,7
Inventive step (IS)	Yes: Claims	
	No: Claims	1-7
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

V. Reasoned statement

1. As indicated under point I.4, this report has been established as if the amendments to the claims as received per telefax on 24/06/05 had not been made, since they are considered to go beyond the content of the disclosure as filed, contrary to the requirements of Article 34(2)(b) PCT. In particular, there is no basis in the application as originally filed for the following features of claim 1:
 - the pivot base is "mounted on said lower pivot shaft (44) at a lower end thereof a distance from said fixed base (52) sufficient only to clear said fixed base during rotation";
 - the swivel actuator is operative "to drive said lower pivot shaft (44) in either of two rotational directions relative to said fixed base (52)";
 - "wherein said upper shaft is axially aligned with said lower pivot shaft".Furthermore, no basis can be found in the application as filed for the term "proximate" introduced into claim 2, nor for the subject matter of claims 4, 6 & 7. Consequently, the report has been established on the basis of the claims as originally filed, as foreseen by Rule 70.2(c) PCT.
2. US-A-4 015 728 (D1) discloses a swing boom assembly comprising a fixed base 42, pivot base 26, boom 16, upper shaft 13/54, clevis plates 32 and bearing 52 as specified in claim 1. It follows that the subject matter of claim 1 fails to meet the requirements of novelty, Article 33(2) PCT.
3. Concerning the additional subject matter of the dependent claims:
 - claims 2-4, 6 & 7 are known from D1, and so lack novelty, Article 33(2) PCT;
 - claim 5 relates to an obvious application of the assembly of D1 in a neighbouring technical field (cf. US-A-4 127 152), and fails to involve an inventive step, Article 33(3) PCT.

VII. Certain defects in the application

1. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

SWING BOOM PIVOT MECHANISM

FIELD

The present invention relates to an improved attachment arrangement for mounting a pivot base to the boom of a Swing Boom Assembly used on a skidder.

BACKGROUND OF THE INVENTION

Skidders are used in the forest industry to retrieve and load felled trees. Most consist of a prime mover, and a grapple attached to the end of a boom. Booms are typically mounted to the prime mover through a base allowing movement in a vertical plane. Side to side movement is accomplished through movement of the prime mover. Added maneuverability can be obtained by adding a pivoting base to which the boom is attached allowing the boom to swing about a vertical axis relative to the prime mover. This type of boom is commonly referred to as a Swing Boom Assembly.

The method of mounting the pivot to the base and boom becomes critical to prevent overloading of components. The boom assembly includes the boom, boom cylinder and grapple.

Referring to Figures 1-4, a conventional method of attaching the main body 30 of a pivot base 22 to the boom assembly 32 of a swing boom 11 is shown. A horizontal pin 24 and boom cylinder 26 connect the boom 28 to the pivot base 22. The extension of the boom cylinder 26 controls the amount of vertical motion of the boom 28.

The pivot base 22 further comprises an upper spherical bearing 34. The upper spherical bearing 34, permit the main

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body 30 of the pivot base 22 to rotate about a vertical axis relative to the fixed base 40.

As shown in Figure 1, conventional designs incorporate an upper pivot shaft 42, rigidly attached to the main body 30 of the pivot base 22. The upper pivot shaft 42 passes through the upper spherical bearing 34. The outer races of the upper spherical bearing 34 is rigidly attached to the fixed base 40.

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As best shown in Figures 2-4, the upper pivot shaft 42 extends past the upper spherical bearing 34. A clevis joint 47 is used to connect the boom cylinder 26 to the upper pivot shaft 42. The line of action of the boom cylinder 26 passes through the upper pivot shaft 42 above the upper spherical bearing 34 creating an overhung loading condition. Depending on the particular loading and position of the boom assembly 32 in the vertical plane, stresses due to the bending moment can become excessive, especially at the connection between the upper pivot shaft 42 and the main body 30 (see Figure 4). As a result, the conventional method of attachment can lead to cracking and failure of the components comprising the vertical axis of the pivot base under severe operating conditions. As such, there is a need for an improved attachment method for mounting the pivot base to the boom assembly.

U.S. Patent No. 4,015,728 issued to Barker et al. discloses a yoke having upper and lower vertically spaced clevis arms at the top and at the bottom of the yoke. A boom is attached to the yoke at the bottom and a hydraulic piston-cylinder is attached between the boom and a top of the yoke.

A shaft passes through the upper and lower sets of clevis arms and spherical bearings are located on the shaft intermediate the arms of each set of clevis arms. The outer raceway of the bearings is mounted to two arms affixed to the vehicle frame. A hydraulic actuator is positioned in the yoke between the sets of clevis plates and around the shaft. Such a system is normally used in circumstances such as in mounting a boom to the rear of a tracked vehicle. However, when mounting a boom on a fixed base or platform, a different mounting assembly is required.

SUMMARY

The present invention relates to a swing boom assembly, which has a fixed base, a pivot base rotatably mounted on the fixed base, and a boom pivotally coupled to the pivot base. The boom is coupled proximate a lower end of the pivot base and has a hydraulic piston cylinder coupled between the boom and an upper end of the pivot base. The hydraulic piston cylinder is operative to raise and lower the boom. The pivot base has an upper shaft, a main body having a pair of spaced apart clevis plates affixed to each end of the upper shaft, wherein the upper shaft is axially aligned with the lower pivot shaft. A spherical bearing is rigidly mounted around the upper shaft between the clevis plates and the bearing having an outer race rigidly mounted to the fixed base.

The hydraulic piston cylinder may be pivotally coupled to the pivot base at a level intermediate the clevis plates.

The clevis plates are preferably integral with the main body.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the invention will be apparent from the following detailed description, given by way of a preferred embodiment taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a vertical sectional view through the middle of the prior art conventional pivot base upper connection;

Figure 2 is a perspective view of the prior art conventional pivot base upper connection;

Figure 3 is a side view of the prior art main body of the pivot base and conventional upper joint;

Figure 4 is a sectional view along line 1-1 of Figure 5A;

Figure 5A is a perspective view of an improved Swing Boom Assembly in a neutral pivot position;

Figure 5B is a perspective view of an improved Swing Boom Assembly in a neutral pivot position;

Figure 6 is a vertical sectional view through the middle of the improved pivot base connection;

Figure 7 is a perspective view of the improved pivot base connection

Figure 8 is a side view of the main body of the pivot base and improved upper line; and

Figure 9 is a sectional view along line 2-2 of Figure 8

DETAILED DESCRIPTION

Referring to Figures 5A and 5B the movement of the main parts of a swing boom 13 are shown. A fixed base 52 is mounted rigidly to the prime mover (not shown). The boom assembly 60 is attached to the pivot base 46. The boom assembly 60 includes the boom 59, boom cylinder 58, and grapple (not shown). The grapple attaches to the boom 59 at

the grapple attachment point 16. The pivot base 46 rotates from side to side as shown by double sided arrow 20 in Figure 5A. The pivot base 46 is shown rotated counterclockwise in Figure 5B. The extension of the boom cylinder 58 controls
5 the amount of vertical motion of the boom 59. The boom 59 may move in a horizontal plane with the movement of the pivot base 46 as shown by arrows 20, as well as a vertical plane as illustrated by arrows 21 in Figure 5B.

10 Referring to Figures 6-9, an improved design for the attachment of the main body 54 of a pivot base 46 to the boom assembly 60 is mounted to the main body 54 of the pivot base 46. The pivot base 46 is modified from the conventional method described in connection with Figures 2-5 at the upper
15 pivot shaft 48. Similar to the conventional method, the outer race of the upper spherical bearing 50 is rigidly mounted to the fixed base 52. However, the main body 54 of the pivot base 46 is extended forming an integral clevis
~~around the upper spherical bearing 50, and both ends of the~~
20 upper pivot shaft 48 are rigidly mounted to the main body 54 (see Figure 9). Advantageously, the new geometry substantially reduces the bending moment on the upper pivot shaft 48 relative to the main body 54, and resultant stresses in the upper pivot shaft 48.

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Referring to Fig. 6, the pivot base 46 is rigidly affixed to lower pivot shaft 44 and the latter is coupled to a lower spherical bearing 36 at its bottom the outer race of which is rigidly affixed to the fixed base 52. A pinion gear
30 62 is positioned around the lower pivot shaft 44 immediately above the lower spherical bearing 36. A pair of rack gears

64 engage the pinion gear 62 on either side thereof and, in response to hydraulic pistons, drive the pinion gear rotationally.

5 Accordingly, while this invention has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications of the illustrative embodiments, as well as other embodiments of the invention, will be apparent to
10 persons skilled in the art upon reference to the description. It is therefore contemplated that the appended claims will cover any such modifications or embodiments as fall within the true scope of the invention.

WE CLAIM:

1. A swing boom assembly, comprising:
 - (a) a fixed base (52);
 - (b) a lower pivot shaft (44) rotatably mounted on said fixed base;
 - (c) a pivot base (46) mounted on said lower pivot shaft (44) at a lower end thereof a distance from said fixed base (52) sufficient only to clear said fixed base during rotation;
 - (d) a swivel actuator (38) coupled to said lower pivot shaft (44) and operative to drive said lower pivot shaft (44) in either of two rotational directions relative to said fixed base (52);
 - (e) a boom (14) pivotally coupled to said pivot base (46) proximate a lower end thereof and having a hydraulic piston cylinder (58) coupled between said boom (14) and an upper end of said pivot base (46) and operative to raise and lower said boom (14);
- wherein said pivot base (46) has
 - (i) an upper shaft (48);
 - (ii) a main body (54) having a pair of spaced apart clevis plates affixed to each end of said upper shaft (48), wherein said upper shaft is axially aligned with said lower pivot shaft;

5 (iii) a spherical bearing (50) rigidly mounted around said upper shaft (48) between said clevis plates and said bearing having an outer race rigidly mounted to said fixed base (52).

10 2. An assembly according to claim 1, wherein said hydraulic piston cylinder (58) is pivotally coupled to said pivot base (46) at a level proximate said clevis plates.

3. An assembly according to claim 1, wherein said fixed base (52) is part of a skidder.

15 4. An assembly according to claim 1, wherein said pivot base (46) is rigidly affixed to a distal portion of said lower pivot shaft (44).

5. An assembly according to claim 1, wherein said clevis plates are integral with said main body (54).

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6. An assembly according to claim 1, including a lower bearing (52) coupled to a lower portion of said shaft and having an outer race rigidly coupled to said fixed base (52).

25 7. The assembly of claim 1, including a bearing coupled to a lower portion of said lower pivot shaft (44) with an outer race rigidly coupled to said fixed base and said pivot base is rigidly affixed to said lower pivot shaft (44).